

# Descriptions of Four New Eulimid Gastropods Parasitic on Irregular Sea Urchins

by

ANDERS WARÉN

Swedish Museum of Natural History, Box 50007, S-10405 Stockholm, Sweden

DANIEL RAY NORRIS

Marine Laboratory, University of Guam, Mangilao, Guam 96923, USA

AND

JOSÉ TEMPLADO

Museo Nacional de Ciencias Naturales J. Guiterrez Abscal 2. E-28006, Madrid, Spain

*Abstract.* *Hypermastus mareticola* is described from Guam, *H. orstomi* from New Caledonia, both parasitizing the heart urchin *Maretia planulata*. *Hypermastus obliquistomum* Warén, 1991 is recorded from the sand dollar *Laganum depressum* from New Caledonia (host species not recorded previously). *Eulima encopicola* is described from the Galapagos Islands, parasitizing the sand dollar *Encope micropora galapagensis*. *Balcis clypeastericola* Habe, 1976, parasitic on the clypeasteroid sea urchin *Clypeaster japonicus* in Japan, is made the type species of a new genus, *Clypeastericola* and a new species *C. natalensis* lives on *Clypeaster eurychoreus*, from southeastern Africa. Two further records of species of *Clypeastericola* are recorded from *Clypeaster australasiae* (Gray), from New South Wales, and from *Laganum depressum* from New Caledonia, but the species are left undescribed.

## INTRODUCTION

Eulimid gastropods are not frequently collected on their hosts unless the echinoderms are specifically searched and handled with care; most eulimids have the capacity to voluntarily leave (and many do it regularly) the echinoderms on which they are feeding. Therefore, the most profitable way to find eulimids is by intertidal collecting, where one can see them directly when picking up the echinoderms, and they do not have the time to pull out their proboscis and drop off the host.

Occasionally, eulimids are found as a side result of other investigations when hosts are collected, especially eulimids permanently attached to their hosts. This paper is based on such material sent to the senior author for identification. The material presented here is not extensive, but it improves our knowledge of the groups, especially the host-parasite relations. Here we describe one new genus and four new species which parasitize "irregular" sea urchins.

There are very few records and specimens of such eulimids (Warén & Crossland, 1991).

A complication of eulimid nomenclature which concerns the species parasitic on irregular sea urchins was the introduction of an ichnogenetic name, *Heckerina* (Alekseev & Endelman, 1989). This was created for some holes, diameter 1.0-2.3 mm, in tests of Cretaceous specimens of *Galerites orbiculatus* (d'Orbigny, 1854) (Irregularia, Galeritidae). They were assumed to have been caused by eulimid gastropods.

## MATERIALS AND METHODS

The material used for this paper is enumerated under each species. It is now deposited, usually together with voucher specimens of the hosts, in museums listed under "Material examined." The number of available specimens was too small to allow much more than a description of the shell, except of *Hypermastus mareticola* Warén & Norris, sp.

nov., of which a few specimens were serially sectioned for anatomical study. (Those results will be reported later.)

Author names of the new species are to be quoted as in the headings for each species.

### SYSTEMATICS

#### Family EULIMIDAE Philippi, 1852

##### *Hypermastus* Pilsbry, 1899

*Hypermastus* Pilsbry, 1899:258. Type species: *H. coxi* Pilsbry, 1899, by original designation, Australia, New South Wales, Port Stephens. Host not known.

**Remarks:** Warén & Crossland (1991) reviewed the species assumed or known to belong to *Hypermastus*. Eleven species are known to live on irregular sea urchins in tropical regions. Habe (1992) has since described one species from an echinothurid sea urchin from Japan, *Hypermastus araeosomae* Habe, 1992, but that species differs from the others by having a light yellow shell, and since very little else is known about it, we consider the systematic position provisional.

The two new species described below are also questionable members of *Hypermastus*, but presently there is no genus available where they fit better.

##### *Hypermastus mareticola* Warén & Norris, sp. nov.

(Figures 1–3)

**Type material:** Holotype and four dry and six alcohol-preserved paratypes in Division of Mollusks, U.S. National Museum of Natural History, Washington D.C., register numbers 860367, 860369, and 860368; six paratypes in Swedish Museum of Natural History, register numbers 4531.

**Type locality:** Guam, Apra Harbor, about 10 m depth, parasitic on *Maretia planulata* (Lamarck, 1816) (Spatangidae, Spatangoida). (Voucher specimens USNM E 43011).

**Material examined:** One snail, attached on host (16 mm diameter), Apra Harbor, 10 m, 16 August 1992. Fifteen additional hosts on which snails had been observed in the field but had fallen off during collection or preservation were also studied, and the distribution of the snails on the host is given in Figure 3. A total of 10 snails were obtained from these. In all, 21 snails were collected from hosts during June, July, and August, 1992, all at the type locality.

**Etymology:** Named after the generic name of its host.

**Description:** (Based on supposed females.) Shell (Figure 1A–E) tall, slender, greyish-transparent, almost perfectly smooth. The larval shell (Figure 1F) is colorless, cylindrical, mucronate, obliquely inserted, with slightly more than 1.5 whorls and a height of 300–320  $\mu$ m. The holotype has 7.0 distinctly convex teleoconch whorls, with a very shallow and inconspicuous suture. There are seven rather

evenly distributed incremental scars with intervals of 0.7–1.3 whorls. The scars are very thin and not conspicuously deepened, except close to the apical suture. There is no sculpture except some incremental unevenness in the shell which hardly deserves the term “incremental lines.” The subsutural zone is conspicuous, and its height corresponds to about 25% of the height of the whorl. The aperture is pear-shaped, rather tall, with a distinct parietal callus, but no distinct angle between the parietal wall and columella. The outer lip is very slightly prosocline, retracted at the suture and most protruding just apically to the mid-point.

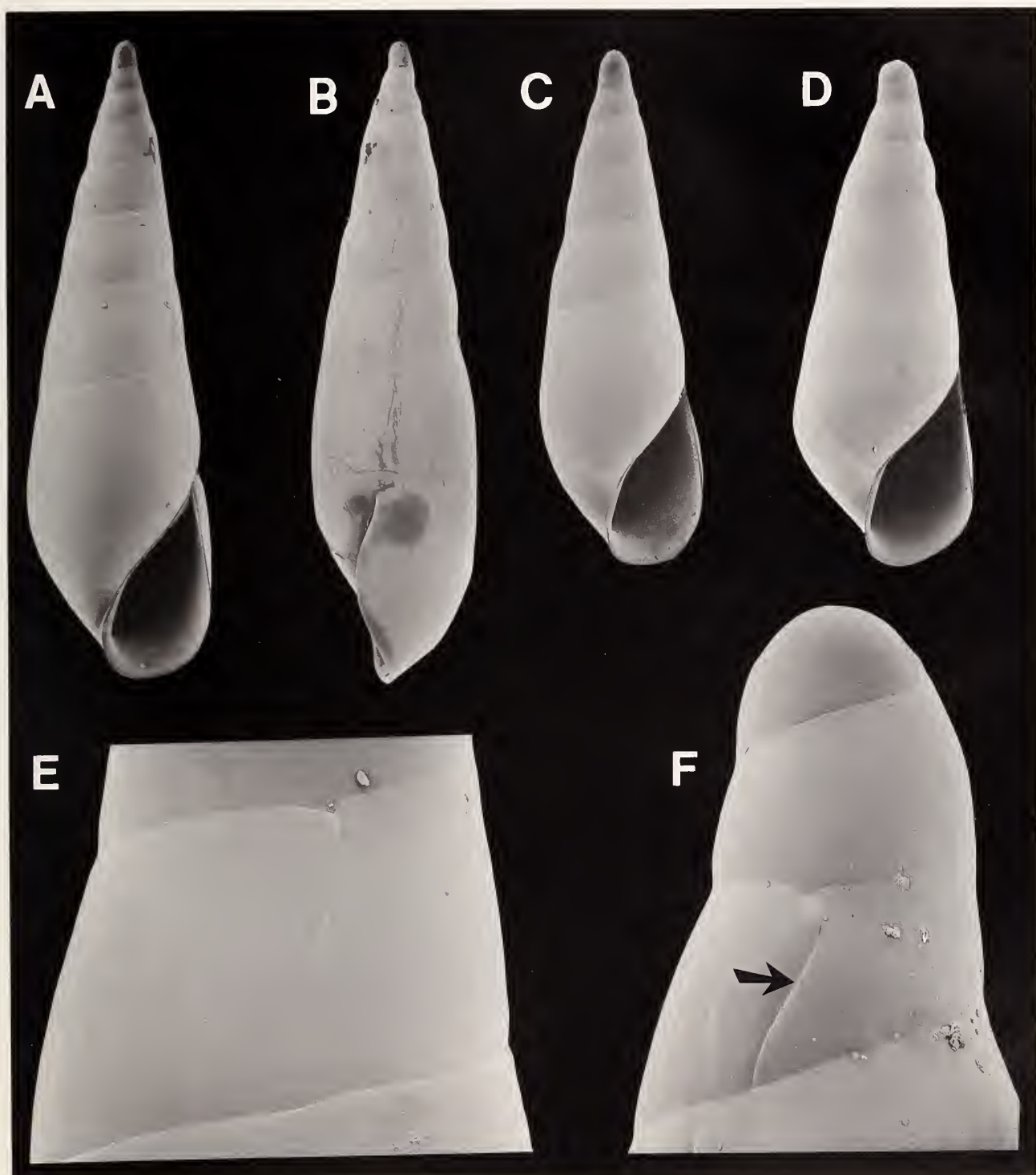
**Male.** (Figure 1C) about 60% of the height of the female and slightly more slender.

**Dimensions.** Eighteen mature specimens collected June–August 1992 had the following shell heights: 5.20, 5.00, 4.72, 4.64, 4.40, 4.24, 4.04, 3.96, 3.76, 3.72, 3.24, 3.16, 3.00, 2.92, 2.80, 2.56, 2.52, 2.52 mm. Four immature specimens (recognized by the angular periphery of the body whorl, Figure 1D) were 4.60, 2.56, 1.88, 1.88 mm. The height of the holotype is 4.40 mm, its breadth is 2.52 mm.

**Soft parts.** The eyes are large, 80  $\mu$ m in diameter, and situated 200  $\mu$ m apart, basally at the outside of the tentacles. The tentacles are tapering, slightly longer than the distance between the eyes. The proboscis is fully retractile. The foot is larger than the opercular lobes and has a distinct propodium. In preserved specimens, it is displaced toward the right side. The operculum fills the aperture and is very thin and colorless with no reinforcing ribs or special muscular attachments. Five specimens of the following sizes were decalcified for serial sectioning: 5.2 mm, 5.0 mm, 4.6 mm (supposed females and immature female), 3.2, and 3.0 mm (supposed males). The two large specimens and the one of intermediate size all had oviducts but lacked a penis. The two small specimens assumed to be males had a penis. The sex of these specimens was confirmed at serial sectioning and examination of the gonad.

**Remarks:** *Hypermastus mareticola* was found on its host in connection with ecologic work on *Maretia planulata* and *Metalia dicrana* H. L. Clark, 1917 (Brissidae) in Guam. Although these two heart urchins occur microsypatrically, the eulimid was found only on the former species. Some details of the ecology of the host were described by Norris (1992).

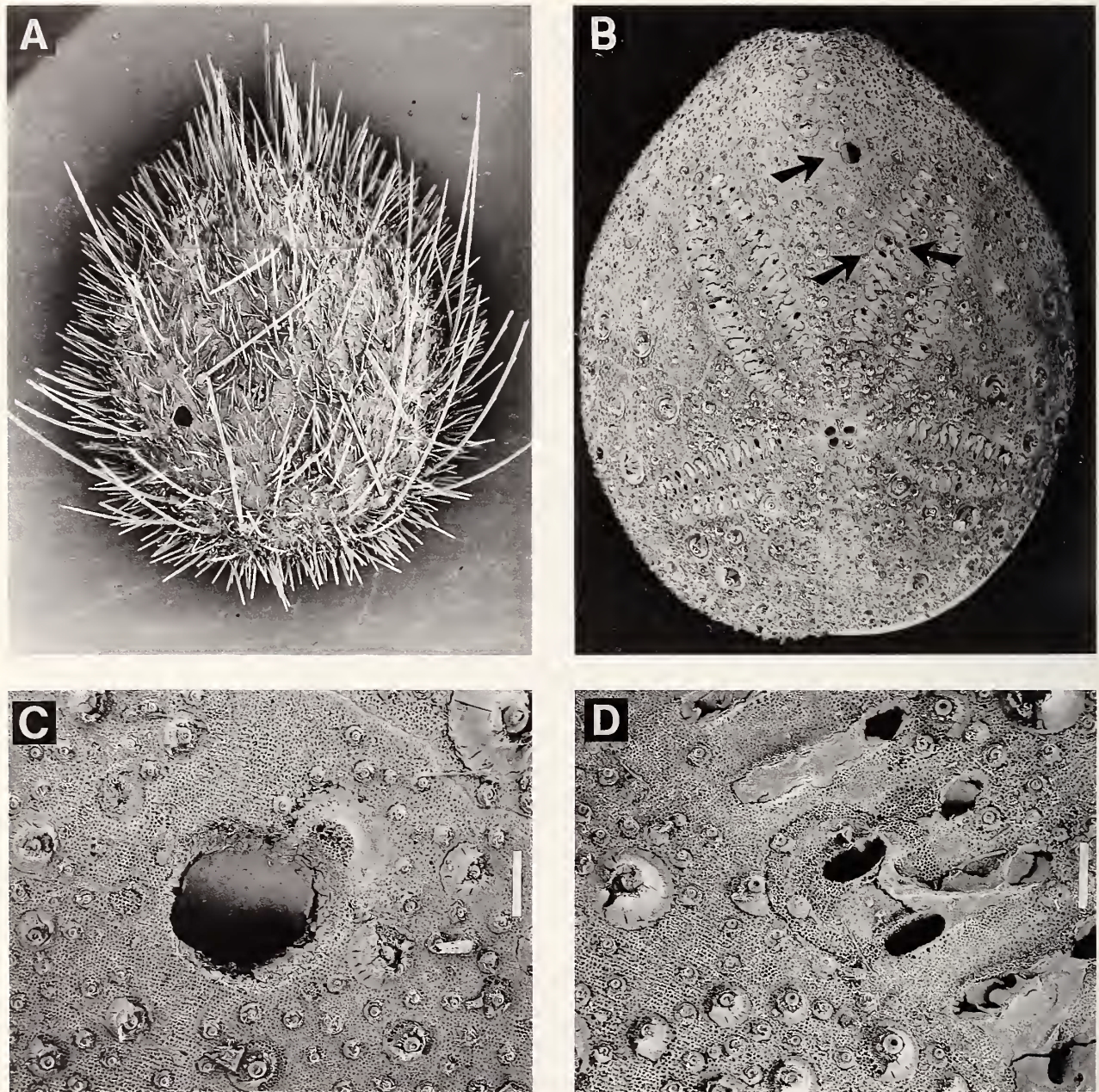
One snail was still attached on its host (16 mm diameter) by pinching two pedicellariae between its operculum and peristome. It was positioned dorsally over the right posterior ambulacrum, about 5 mm from the gonopores and between the two double rows of tube-feet. A small area, about 0.8 mm diameter, was slightly discolored, darker brown, with a hole from the proboscis in the center. Inside the host, there was a corresponding discolored, slightly swollen area, but no indication that the proboscis had gone farther, as to the gonads. There was no proboscis of the parasite protruding from the hole, and no torn proboscis could be seen on the snail, which indicates that it is fully retractile.



Explanation of Figure 1A-F

Figure 1A-F. *Hypermastus mareticola* Warén & Norris, sp. nov., syntypes. A-B. 4.6 mm (female?). C. 2.8 mm (male?). D. 1.9 mm (young female?). E. Incremental scar, length 380  $\mu$ m. F. Larval shell, height 310  $\mu$ m.





Explanation of Figure 2A-D

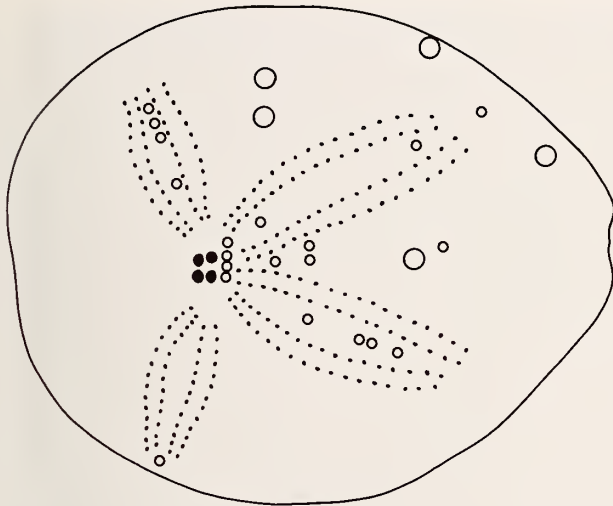
Figure 2A-D. *Muretia planulata*, with damages of test from being parasitized by *Hypermastus mareticola* Warén & Norris, sp. nov. (marked by arrows). A. Diameter of test 11.6 mm diameter (excl. spines). B. 17.4 mm diameter. C. Large hole on specimen B, diameter 0.5 mm. D. Small scar around a hole of a tube foot. Scale bar 0.25 mm.

A rough estimate is that 10-25 percent of the host specimens were infested; and 20 percent of the parasitized specimens of *Muretia planulata* had more than one snail, with a maximum of four snails on the single host.

The 15 host specimens represented in Figure 3 had a total of 25 holes from proboscides. Two of the holes seemed to be healing. Ten specimens of the parasite were saved,

which means either that 15 specimens were lost (which is possible), or that the snail frequently changes host or position on the host, and leaves a hole on the host. We cannot say which of these possibilities best explains the discrepancy, perhaps it is a combination. All snails had been attached aborally on the test, and their distribution is plotted in Figure 3. This figure indicates that they prefer the





Explanation of Figure 3

Figure 3. Distribution of holes and scars made by *Hypermastus mareticola* Marén & Norris, sp. nov. on 15 specimens of *Maretia planulata*, on which the eulimid was found. The size of the hosts (10–18 mm test diameter) has been standardized to make comparisons possible. Large circles indicate large holes (Figure 2C).

leeward side, perhaps to avoid getting scraped off when the sea urchin is moving forward in the sediment.

The distinction between males and females from shell characters is tentative; it is rare to obtain eulimids in quantities large enough to allow impeccable statistics, especially since the procedure is destructive. Nevertheless, we find it worth drawing attention to this assumed sexual dimorphism.

*Hypermastus mareticola* is not a very characteristic species, but the cylindrical, mucronate larval shell drastically reduces the number of genera from which to choose. It bears some resemblance to *Balcis echinocardiaphila* Habe, 1976 (Figure 5A–B), a species parasitic on the heart urchin *Echinocardium cordatum* (Pennant) in Japan (not on *Spatangus purpurea* as quoted in Warén & Crossland, 1991). That species is, however, considerably larger, about 13 mm, and has a more ovate aperture. No soft parts have been described from *Balcis echinocardiaphila*, which makes comparison difficult. It is likely that they will end up in the same (new) genus in the future.

*Hypermastus orstomi* Warén, sp. nov.

(Figures 4A–E)

**Type material:** Holotype and two paratypes in Laboratoire de Biologie des Invertébrés Marins et de Malacologie, Museum National d'Histoire Naturelle, Paris.

**Type locality:** New Caledonia, Lagon de Noumea, Grande Rade, 22°15.26'S, 166°23.98'E, 11–12 m depth, sand with ooze on surface, 14 April 1993, three specimens attached dorsally on *Maretia planulata* (P. Bouchet, Labora-

toire de Biologie des Invertébrés Marins et de Malacologie, Museum National d'Histoire Naturelle, Paris).

**Material examined:** Only known from the type material.

**Etymology:** Named after L'Institut Français de Recherche Scientifique pour le Développement en Coopération, formerly Office de la Recherche Scientifique et Technique Outre-Mer (ORSTOM), whose personnel in Noumea has sent the senior author numerous new and interesting eulimids with host information.

**Description:** (Sex not known.) The shell (Figure 4A–C) is short, stout, conically ovate, colorless, transparent, with mucronate apex and large aperture. Protoconch 1 (Figure 4B) is colorless, and has 1.7 perfectly smooth whorls with very indistinct suture. Its height is about 250  $\mu$ m but varies according to how much is concealed by the subsequent whorl. There is no protoconch 2. The holotype has 8.0 perfectly smooth, very flat whorls with a few indistinct incremental lines, mainly restricted to the subsutural zone, and two to four slightly stronger incremental scars. The suture is barely visible, the false suture more distinct, and the subsutural zone occupies one-fifth to one-sixth of the height of the whorls. The peristome is rather oblique, pear-shaped, slender, and somewhat expanded in its lower part. Seen in profile, the outer lip is prosocline, retracted at the suture and most protruding just apically to its mid-point.

**Dimensions.** Height of holotype 5.89 mm.

**Remarks:** Since only three specimens were available, it was not possible to examine the soft parts (this requires that the shell is dissolved). The few cases available show that *H. orstomi* causes unusually little disturbance of the test of the host. A few spines had fallen off around the point of attachment apically within one of the petals, and the area around was slightly darker than its surroundings.

*Hypermastus orstomi* is broader and shorter than most eulimids, especially those assigned to *Hypermastus*. *Hypermastus coxi* has similar proportions between breadth and height, but is more cylindrical with much more rapidly expanding apical teleoconch whorls (see Warén & Crossland, 1991, fig. 4A–F). Species of *Turveria* (see Warén & Crossland, 1991, figs. 9H–I, 10A–B) have a similar shape of the shell, but an apically more constricted aperture and a color pattern on the shell.

*Hypermastus obliquistomum* Warén, 1991

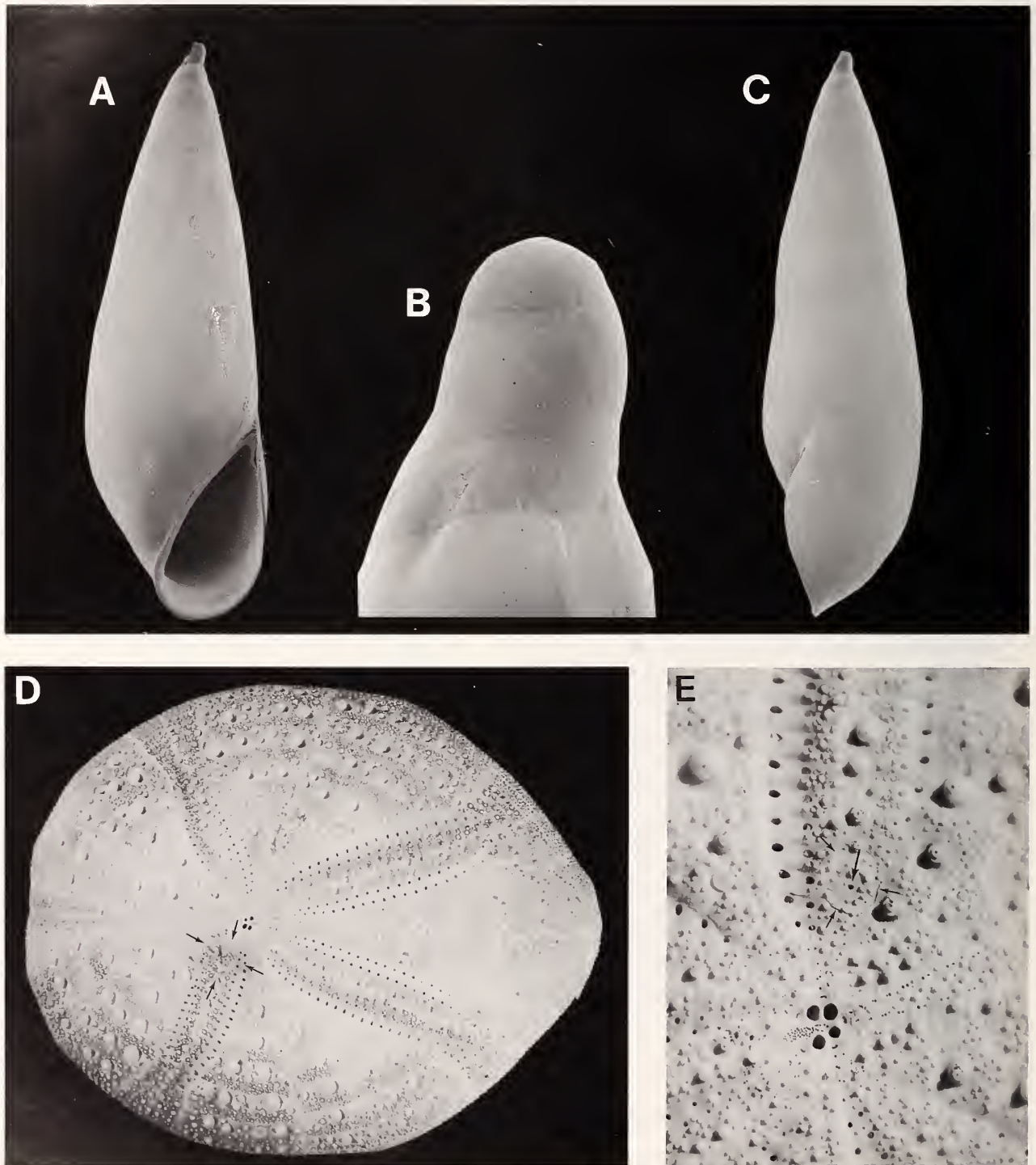
(Figure 6A–F)

*Hypermastus obliquistomum* Warén, in Warén & Crossland, 1991:100, figs. 7E, 7F, 12H.

**Type material:** Holotype, Australian Museum, Sydney, c.160815.

**Type locality:** From oral side of "sand dollars," Mud flat, Baie des Isoles, Noumea, New Caledonia.

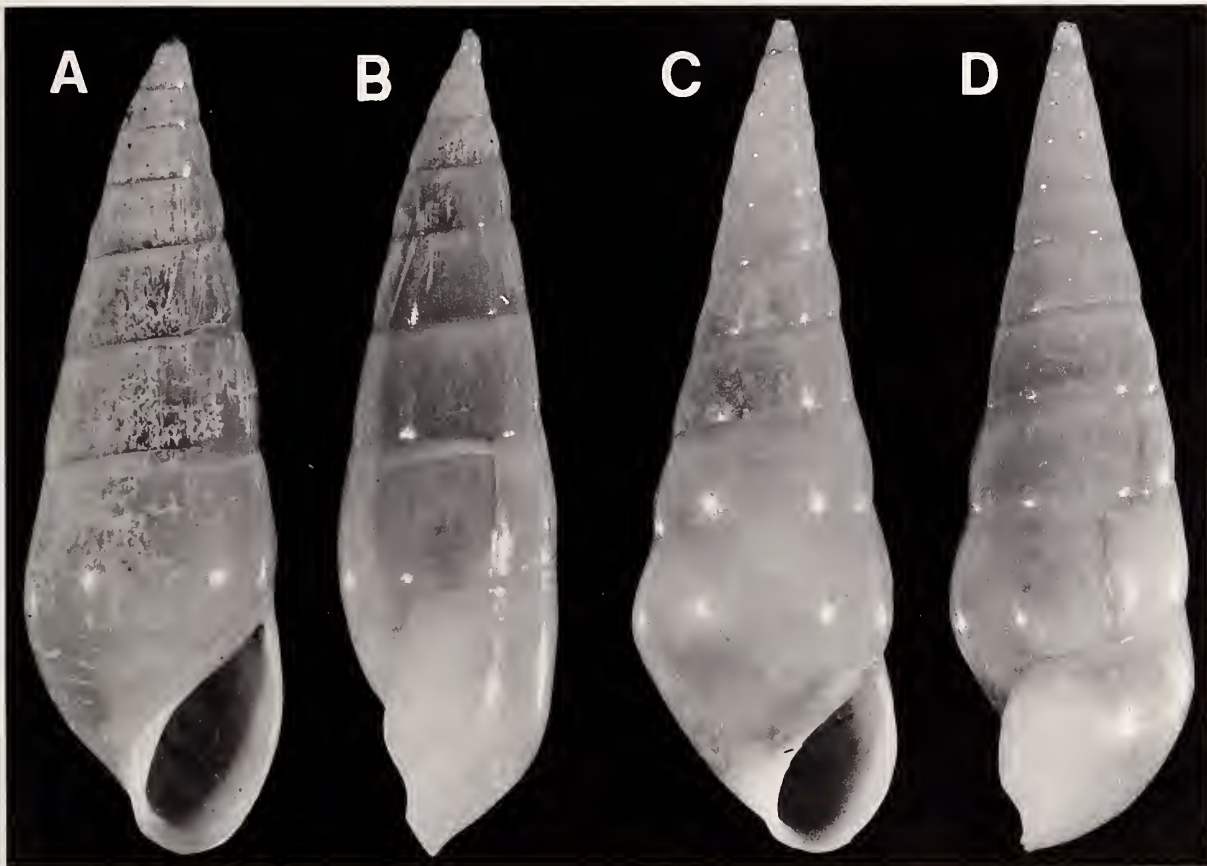
**New material:** Northern New Caledonia, N/O Alis station DW 1181, 19°23.9'S, 163°14.7'E, 45 m, 31 October



Explanation of Figure 4A-E

Figure 4A-E. *Hypermastus orstomi* Warén, sp. nov. and its host *Marettia planulata*. A, C. Paratypes, height of shells 5.5 mm. B. Protoconch, height 240  $\mu\text{m}$ . D. Aboral view of test, host of one specimen of *Hypermastus orstomi* Warén, sp. nov. Area of attachment indicated by fine arrows. Diameter of test 46 mm. E. Enlargement of central part of test, showing apical area with four gonopores and the area of attachment (fine arrows) for the proximal part of the proboscis. Penetration of test (diameter 0.1 mm) marked by slightly larger arrow. Horizontal width of picture 7 mm.





Explanation of Figure 5A-D

Figure 5A-B. "*Balcis*" *echinocardiaphila* Habe, syntypes National Science Museum, Tokyo, register number 52460, height of shell 13.1 and 11.9 mm respectively. C-D. *Clypeastericola clypeastericola* (Habe), syntype, National Science Museum, Tokyo, register number 52468, height of shell 14.2 mm.

1989, one specimen attached orally on *Laganum depressum* L. Agassiz, 1841 (Laganidae); New Caledonia, Lagoon de Noumea, Quatre Bancs de l'Ouest, 22°25.36'S, 166°27.77'E, 12 m depth, sand bottom with *Halimeda* and *Sargassum*, 10 *L. depressum* parasitized on oral side among ca. 350 specimens examined 19 April 1993 (P. Bouchet, Laboratoire de Biologie des Invertébrés Marins et de Malacologie, Museum National d'Histoire Naturelle, Paris).

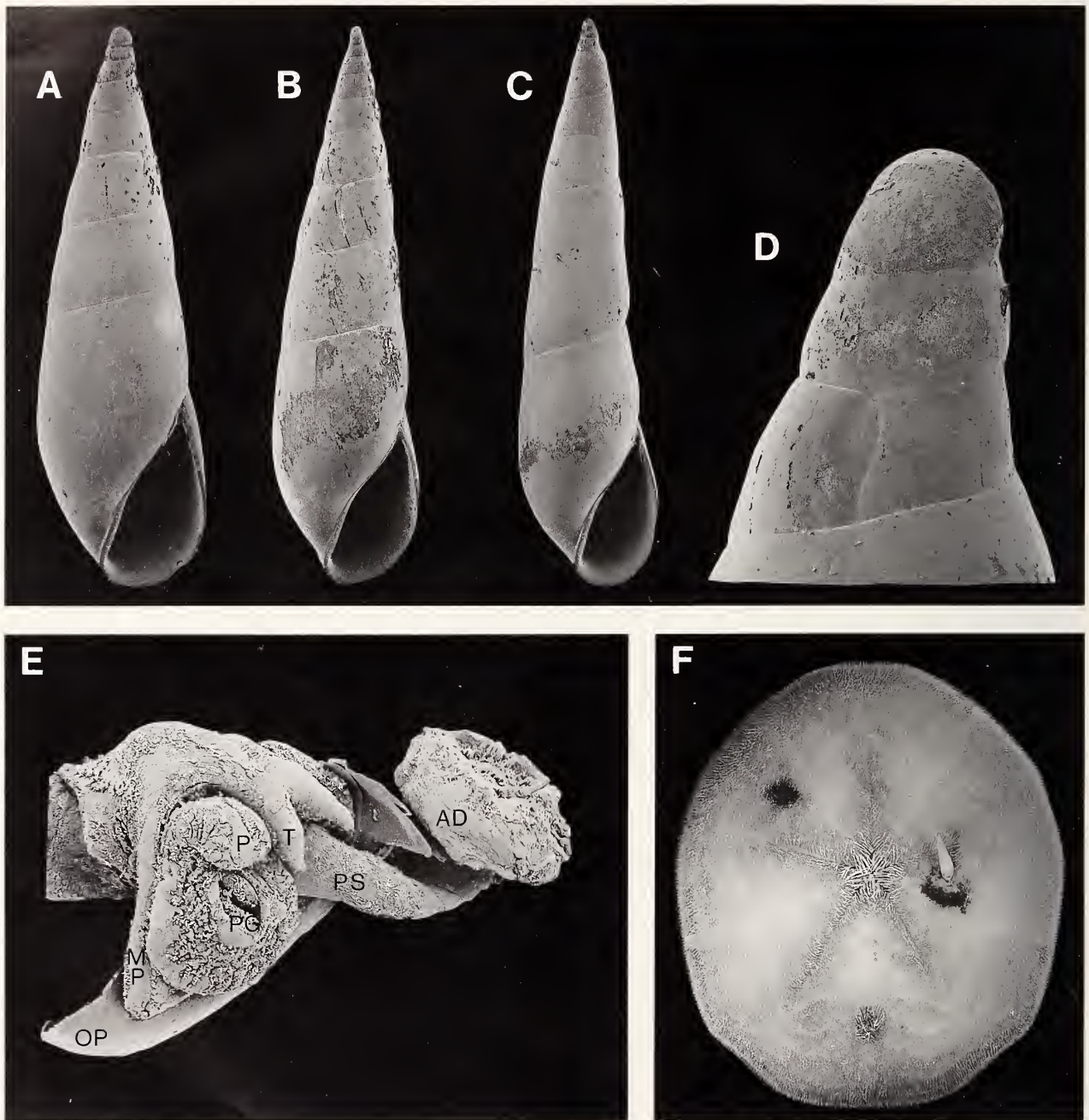
**Distribution:** Only known from the holotype and the present specimens, all from New Caledonia.

**Remarks:** This species was previously known from the holotype, found on an unidentified sand dollar from New Caledonia. The new material makes it possible to give some additional information and to describe the morphology of the head-foot, which is rather small but functional. The tentacles are long, smooth, regularly conical, with large black eyes in indistinct lateral bulges on the sides of the bases. The inner sides meet centrally over the proboscis opening. The foot is small, broader posteriorly, with an inconspicuous propodium and a large and conspicuous

opening for the posterior pedal gland. The metapodium forms a conspicuous ridge on the right side and an almost tongue-shaped flap on the left side, considerably larger than the left one. The proximal part of the proboscis sheath is large and voluminous and ends with a sucker-shaped disc which is used to attach the snail to the test of the host. From the underside of this disc exits the much more slender distal part of the sheath, which penetrates the test, is highly extensible, and may be extended two or three times the length of the shell.

Two specimens had originally been parasitizing the host collected in 1989, close to each other (Figure 6E), but one of them had evidently been torn off or left the host. When Warén received the specimen, the second specimen had also fallen off.

Of the 10 hosts collected in 1993, eight hosts had a single scar, one had two, and one had three scars, which means that the observed rate of infestation by more than one specimen is considerably higher than a random distribution admits. The size range of the 11 specimens (two were lost when collected) is 8.1–5.8 mm; a single specimen measures



Explanation of Figure 6A-F

Figure 6A-F. *Hypermastus obliquistomum* and its host *Laganum depressum*. A. Assumed male 4.2 mm high. B. Female, 8.3 mm high. C. Assumed secondary female, 6.4 mm high. D. Larval shell, height 370  $\mu$ m. E. Critical point dried head-foot of *H. obliquistomum*; pallial skirt and visceral mass removed. Width of foot 0.25 mm. F. *Laganum depressum*, oral side with *H. obliquistomum*. Diameter of test 60 mm. AD—attachment disc of proboscis; MP—metapodial (opercular) fold; OP—operculum; P—propodium; PG—posterior pedal gland; PS—proximal part of proboscis sheath; T—cephalic tentacles.



4.15 mm. Among the larger ones, there is a distinct dimorphism in shell shape, some specimens being considerably more slender (Figure 6C). One specimen of each type was decalcified and sexed. The less slender one was a female, the more slender one was also determined to be a female, but with a vestigial penis. Both specimens had well-developed pallial oviducts. This may indicate that some specimens develop directly to females, while others pass through a male period.

The sites of attachment are indicated by narrow holes in the test with a diameter of about 0.1 mm. The hole is surrounded by a scar where the proboscis sheath has been attached, and a much larger, 4–8 mm diameter, surface which is denuded of spines and somewhat blackened. The scar from the sucker is usually surrounded by a dark, small mucus collar.

A host specimen with one empty scar and one specimen of *H. obliquistomum* still attached was dissected, and there were still slender proboscides remaining inside the test, under both holes, both of them ending freely in the cavities of the gonads.

The thick, proximal part of the proboscis can evidently be retracted inside the cephalic haemocoel and must therefore be considered a part of the proboscis sheath, not a snout, which it could be mistaken for when examined in an everted state. The damage of the test of the host indicates that at least the females stay for a considerable period of time on the same spot and only occasionally leave the host.

*Hypermastus obliquistomum* resembles *H. colmani* Warén, 1991, presumed to parasitize *Peronella leseuri* (Valenciennes, 1841) (Laganidae) in Australia. That species does, however, differ in having a taller protoconch with three convex whorls and a height of 0.46 mm.

#### *Eulima* Risso, 1826

*Eulima* Risso, 1826:123. Type species: *Turbo subulatus* Donovan, 1804 (= *Eulima glabra* (Da Costa, 1778)) (Warén 1992; ICZN, Opinion 1718), European. Parasitic on ophiuroids.

**Remarks:** The generic name *Eulima* has been used for a broad range of eulimids in the literature, but Warén (1983) gave some information about the type species and a very similar species, *E. bilineata* Alder. These species have a ptenoglossate radula, used for catching coelomocytes in the coelomic cavities of the hosts (unpublished). The new species below differs in parasitizing a sand dollar echinoid and in lacking a radula. Otherwise it is very similar, in shell characters and in being a hermaphrodite of some kind. We have therefore decided to keep this species in *Eulima*, although it is likely that it will need a new genus.

*Eulima encopicola* Warén & Templado, sp. nov.

(Figures 7A–E)

**Type material:** Holotype and the single paratype in Mu-

seo Nacional de Ciencias Naturales, Madrid, Spain, register number 15.05/6958.

**Type locality:** Galapagos Islands, Santiago Island (James Island), Sullivan Bay, Bartolome inlet. 19 March 1991. On a specimen of *Encope micropora galapagensis* A. H. Clark, 1946 (Encopidae), the larger one, holotype, (4.76 mm) attached on the oral side; the smaller one (3.04 mm) on the aboral side.

**Description:** Shell (Figure 7A–D) tall, conical, slender, transparent with some brownish color in the subsutural zone and on the body whorl. The larval shell (Figure 7E) is blunt, evenly rounded, not obviously colored, consists of slightly more than one whorl and has a height of 330  $\mu$ m. The holotype has 7.5 almost flat teleoconch whorls, sculptured with distinct, sharp, close-set, but not very uniformly spaced incremental lines, and six irregularly spaced incremental scars (Figure 7D) of varying strength. The subsutural zone is conspicuous, and its height corresponds to about 25% of the height of the whorl. The aperture is tall and slender with a sturdy columellar callus and a thin parietal callus, which together form a distinct angle. The apical corner of the aperture is distinctly drawn out and constricted. The outer lip is slightly damaged in the holotype, but has evidently been very straight and is slightly prosocline.

**Dimensions.** Height of holotype 4.76 mm, diameter 1.40 mm.

**Operculum.** Very thin, fragile and colorless with no reinforcements.

**Soft parts.** The soft parts (preserved in alcohol) have a pinkish hue. The large specimen has a well-developed oviduct and penis; the small one only a penis. The eyes are unusually small, diameter about 20  $\mu$ m and situated about 100  $\mu$ m apart. No other details were seen since the specimens were dried and reconstituted to facilitate the extraction of the soft parts for radular preparation. The anterior pedal gland is very large and invades the cephalopodal haemocoel. No radula was found in any of the specimens.

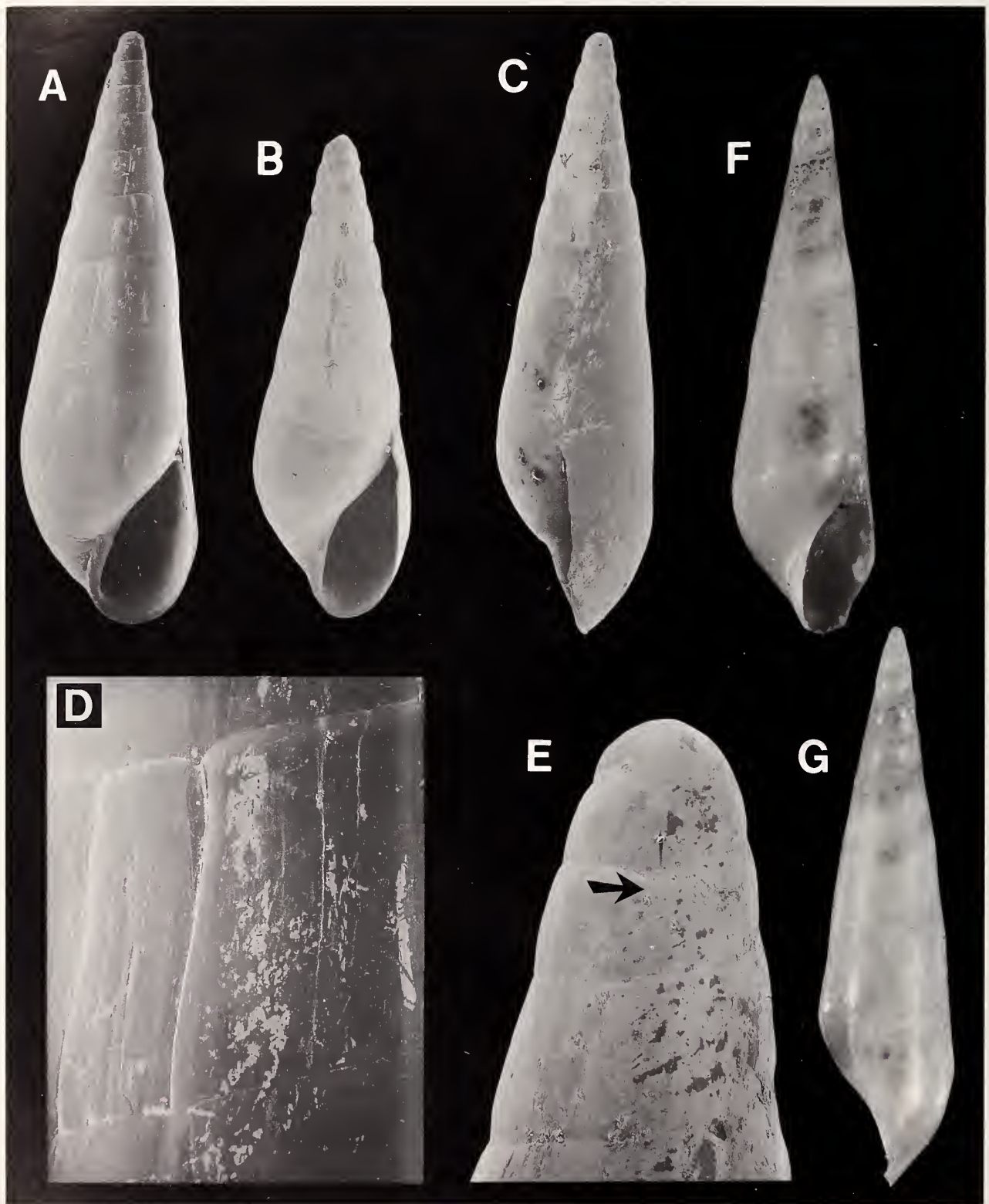
**Etymology:** Named after the generic name of its host.

**Remarks:** *Strombiformis barthelowi* Bartsch, 1917 (Figure 7F–G), from the Gulf of California, is of a similar size and shape, but the initial whorl of the protoconch (I) is very small, the larval shell is distinctly conical with 2–3 whorls, and the whole shell is indistinctly yellowish (not easy to see in the holotype because of the remaining dried soft parts).

#### *Clypeastericola* Warén, gen. nov.

Type species: *Balcis clypeastericola* Habe, 1976, from Japan (Figure 5C–D), parasitic on *Clypeaster japonicus* Doederlein, 1885 (Clypeasteridae).

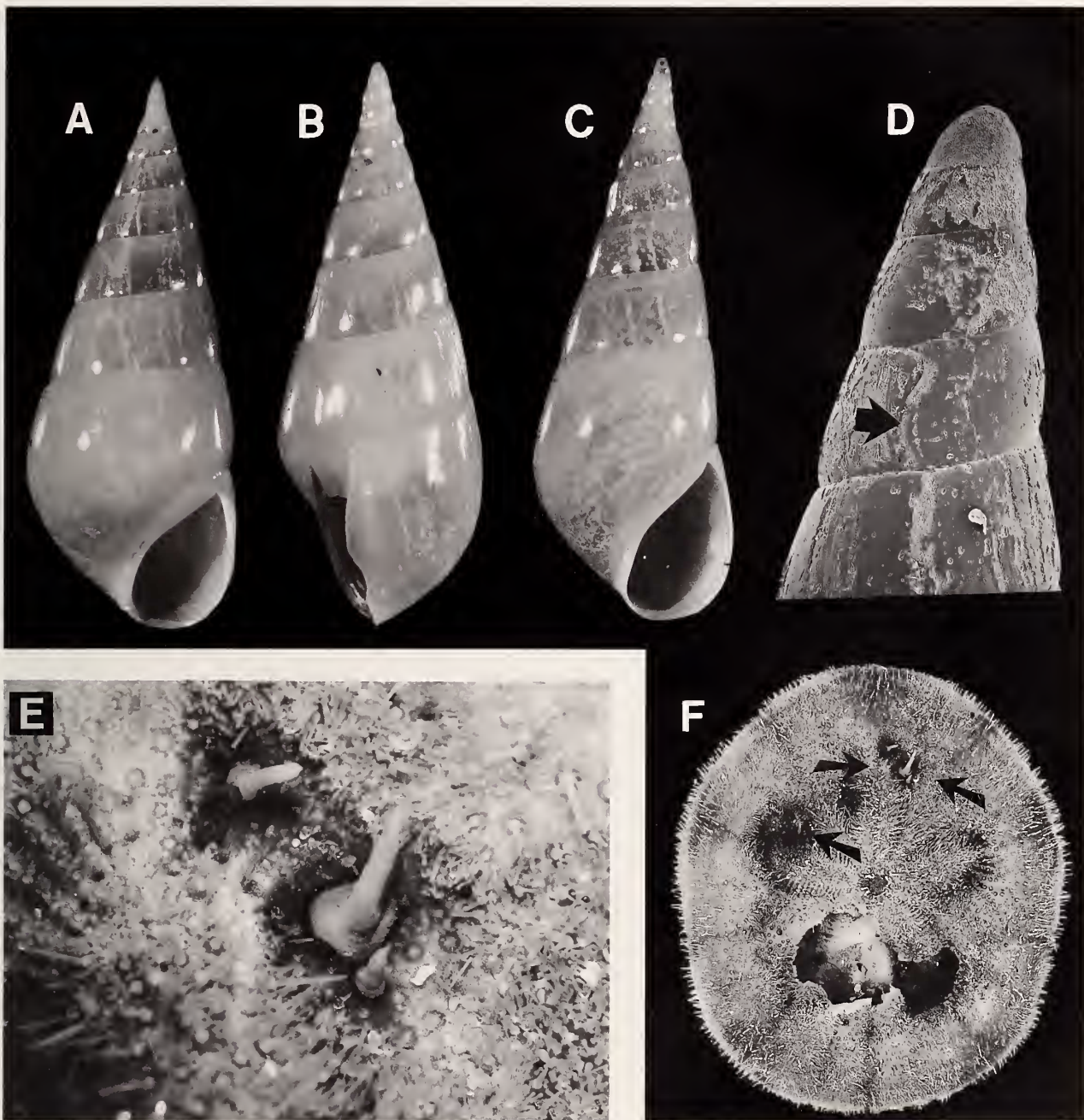
**Diagnosis:** Eulimids with a colorless, slender, smooth, and conical shell. Aperture low, constricted in female, less so



Explanation of Figure 7A-G

Figure 7A-E. *Eulima encopicola* Warén & Templado, sp. nov. A, C. Holotype (female?), height of shell 4.76 mm. B. Paratype, 3.04 mm. D. Incremental scar, length 0.75 mm. E. Larval shell, labial scar indicated by arrows, height of protoconch 330  $\mu$ m. F-G. *Eulima barthelowi* (Bartsch), holotype, USNM 268622, height of shell 4.93 mm.





Explanation of Figure 8A-F

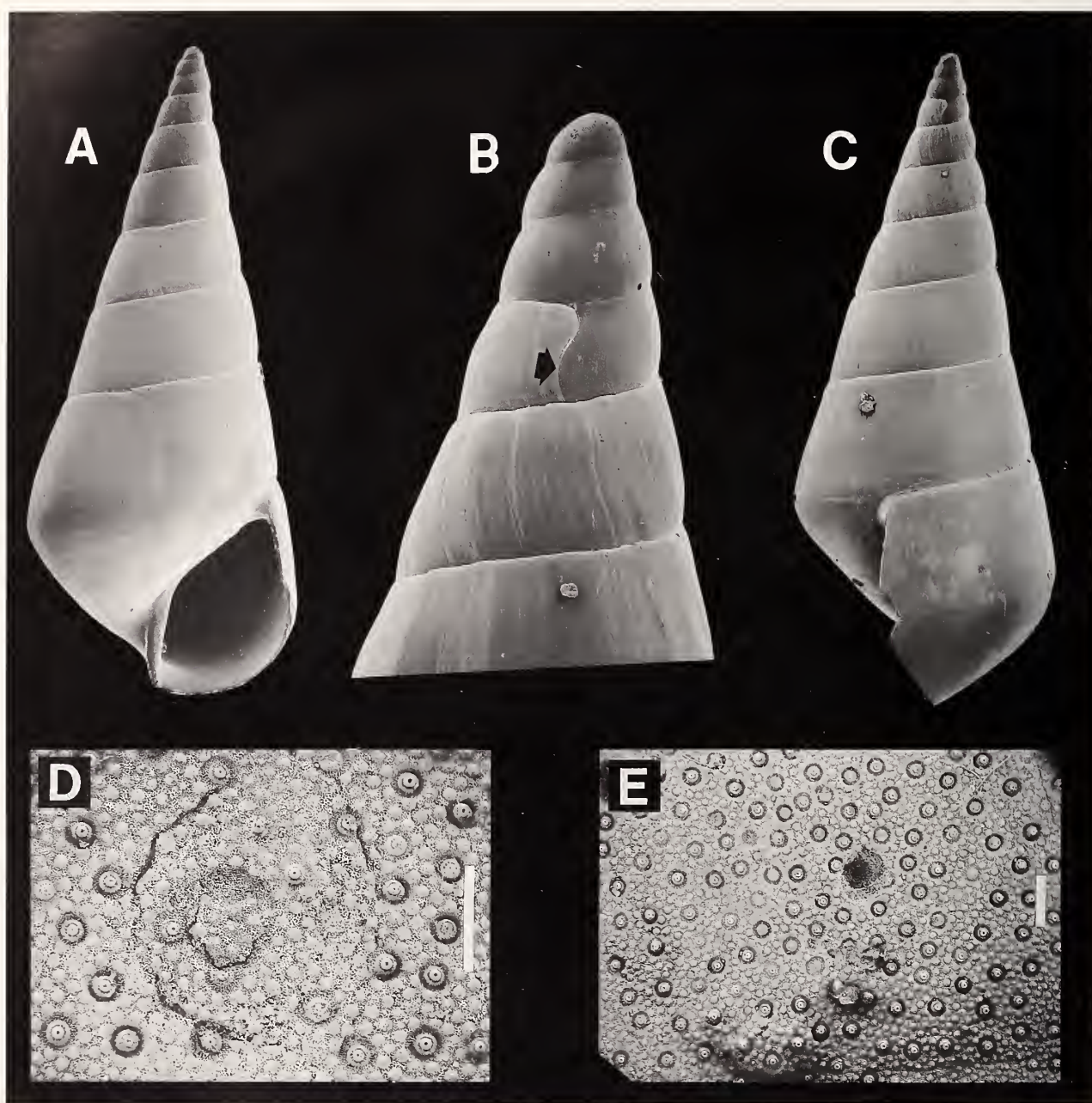
Figure 8A-F. *Clypeastericola natalensis* Warén, sp. nov. and its host *Clypeaster eurychoreus*. A. Holotype (female?), 6.4 mm. B. Young female, 3.9 mm. C. Male, 4.7 mm. D. Larval shell marked with an arrow. Height 460  $\mu$ m. E-F. Host, *Clypeaster eurychoreus*, diameter 41 mm, with remaining proboscides of a group of one female and two males and a second female. E. Detail of F, showing the torn off proboscides.

in male. Proboscis with an attachment disc, more developed in female.

**Etymology:** Named after *Clypeaster*, the host genus for at least three species.

**Remarks:** The diagnosis above is based on the shell of *C.*

*clypeastericola* and *C. natalensis* but on the soft parts of *C. natalensis*, since *C. clypeastericola* has been available only as empty shells. The shells are, however, very similar, and we feel certain that they are congeneric. The similarity in the shape of the aperture of the females, a small dip in the suture, and a corresponding constriction of the peri-



Explanation of Figure 9A-E

Figure 9A-E. *Clypeastericola* sp. and scars on its host *Clypeaster australasiae*. A, C. Height 4.9 mm. B. Larval shell, height of protoconch 520  $\mu\text{m}$ . D-E. Details of test of *Clypeaster australasiae* with scars from *Clypeastericola* sp. Scale lines 1 mm.

stome is a rare feature, obvious only in the genus *Parvioris* Warén 1981. Those species have an operculum with a fold that is deeply inserted in the foot, and they are parasitic on asteroids.

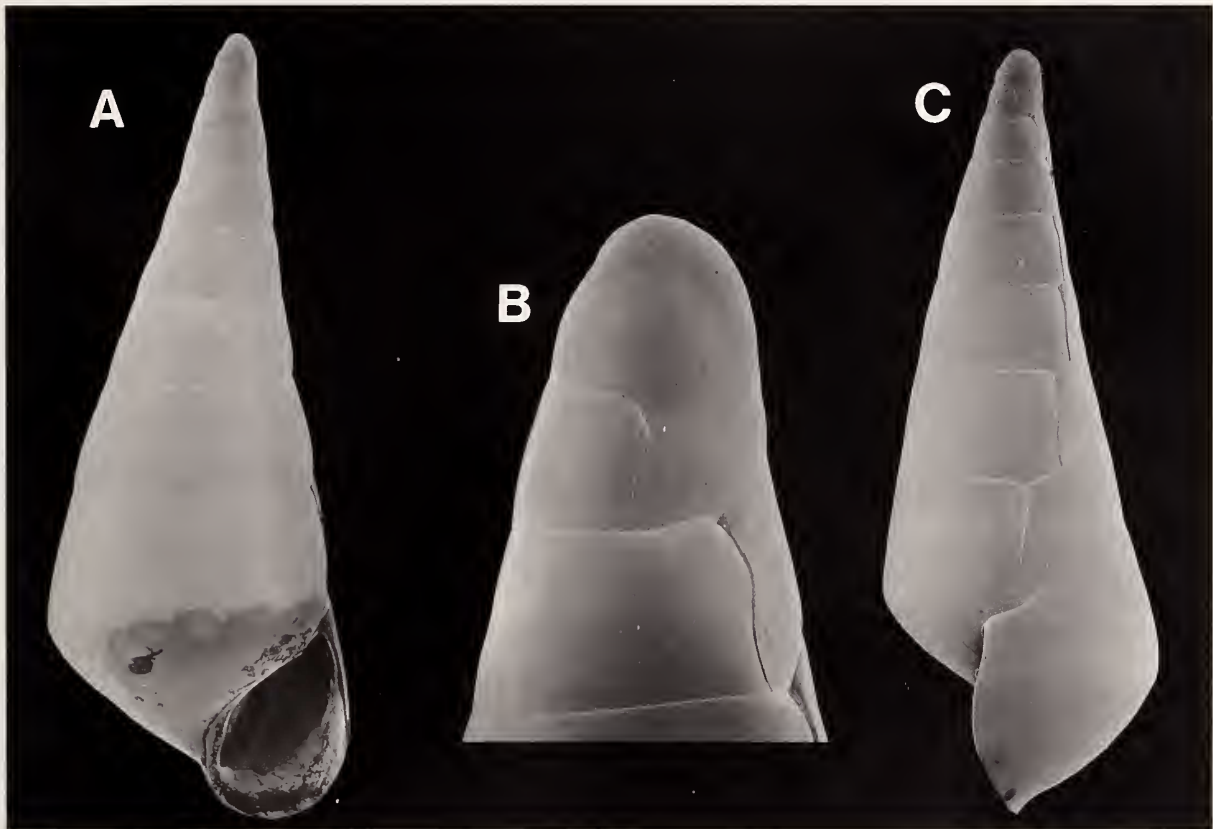
The two undescribed species discussed below have similar shells but are immature, judging from the angular periphery of the body whorl.

*Clypeastericola natalensis* Warén, sp. nov.

(Figures 8A-F)

**Type material:** Holotype, a female, Natal Museum, Pietermaritzburg, register number NMP D 8634/T841; three paratypes, one immature female and two males, S7878/T842.





Explanation of Figure 10A-C

Figure 10A-C. *Clypeastericola* sp. from *Laganum depressum*. A. Front view, 4.0 mm high. B. Protoconch, height 350  $\mu$ m. C. Side view, height 3.8 mm.

**Type locality:** Eastern South Africa, Northern Zululand, southeast of Kosi Estuary, 26°24.1'S, 32°34.8'E, 50 m, fine sand. 08 June 1987, on a small *Clypeaster eurychoreus* Clark, 1924 (Clypeasteridae). One immature female was attached alone, one adult female was accompanied by two males. Position, see Figure 8F.

**Etymology:** Named after the Natal province.

**Description:** Shell (Figure 8A-C) conical, rather inflated, whitish semitransparent, rather solid, smooth and shiny. The conical, tall, and pointed larval shell (Figure 8D) consists of about three whorls and its height is 460  $\mu$ m. The mature female has 8.5 slightly convex whorls. The suture is deep and conspicuous; the false suture is poorly defined and hardly noticeable. The female has two incremental scars, 1.1 and 2.2 whorls from the outer lip. The shell has some irregular and indistinct growth lines and a very irregular and weak spiral striation. The aperture is short and broad, slightly contracted. The parietal callus is well-developed, but there is no distinct angle between the parietal wall and the columella. The outer lip is slightly retracted at the suture and very slightly prosocline.

**Dimensions.** Height of the holotype 6.39 mm, breadth 2.44 mm.

**Male.** Shell slightly more slender and with a single incremental scar about one whorl from the outer lip. Height 3.88 and 4.64 mm.

**Operculum.** Rather thin, slightly yellowish, with a distinct reinforcement rib on the inside.

**Soft parts.** (Of immature female.) The oviduct is beginning to develop as a more solid zone along the right corner of the pallial cavity. The tentacles are long and tapering with large eyes, 100  $\mu$ m diameter and 200  $\mu$ m apart, placed well behind the cleavage between the tentacles. The foot is small, smaller than the opercular lobes. The right side of the anterior part of the head-foot has an epipodial fold ending at the proboscis opening. The metapodium bulges out widely at both sides of the foot; the right one is connected to the right epipodial fold. The propodium is well-developed. There is no trace of a penis.

The proboscis is firmly attached to the test of the host (Figure 8E), over a hole of a tube-foot, which is used for penetrating the test. All proboscides were so firmly attached that they had been torn off, above the attachment

disc. This disc is much broader in the female than in the male. The proboscis of the young female ended freely in the coelomic cavity. The proboscis of the large female was inserted between the coelomic epithelium and the test for 10 mm until reaching a gonad, which was penetrated.

**Remarks:** Probably the epi- and metapodial folds can be used to cover the base of the shells to avoid irritation of the host, but the specimens had nevertheless caused some damage on the test, which was denuded around the snails.

*Clypeastericola natalensis* differs from *C. clypeastericola* in having a shorter and proportionally broader shell (cf. Figures 8A-C and 5C-D).

#### *Clypeastericola* spp.

(Figures 9A-E, 10A-C)

**Material examined:** (Species 1.) Australia, New South Wales, off Port Hacking, on *Clypeaster australasiae* (Gray, 1851) (Clypeasteridae), taken by a trawler, one young specimen attached to test, AMS C 108275.

(Species 2.) New Caledonia, Lagon de Noumea, Grande Rade, 22°15.26'S, 166°23.98'E, 11-12 m, sand with ooze on surface, 14 April 1993, two immature specimens attached on aboral side of *Laganum depressum* (P. Bouchet, Laboratoire de Biologie des Invertébrés Marins et de Malacologie, Museum National d'Histoire Naturelle, Paris).

**Remarks:** The test of the Australian host had three perforations (two figured in Figure 9D-E), indicating that it had been the host of at least that number of specimens. The remaining one is figured in Figure 9A-C.

The New Caledonian species differs in being more slender with flatter whorls and in having a smaller protoconch with less than two whorls (almost three in the Australian specimen).

We find these young specimens worth mentioning but not naming. The shells are quite similar to the two species of *Clypeastericola* described above, and contribute to the reasons for this introduction of a new name.

#### ACKNOWLEDGMENTS

We thank the Malacology sections at the Museum National D'Histoire Naturelle, Paris, the Australian Museum, Sydney, and the Natal Museum, Pietermaritzburg, South Africa, who contributed specimens for this study. Christine Hammar, Stockholm, prepared Figure 3 and the prints used for the plates. R. Rabago, P. Rabago, and C. I. Norris (Guam) assisted in the collection of specimens in Guam. This is Contribution 344 from the University of Guam Marine Laboratory.

#### LITERATURE CITED

- ALEKSEEV, A. S. & L. G. ENDELMAN. 1989. Association of ectoparasitic prosobranch gastropods with Upper Cretaceous echinoid *Galerites*. Pp. 165-174 In: Fossil and Recent Echinoderm Researches. Academy of Sciences of the Estonian SSR.
- HABE, T. 1976. Parasitic gastropods from echinoderms of Japan. Bulletin of the National Science Museum Series A. Zoology 2:157-168.
- HABE, T. 1992. A new species, *Hypermastus araesomae* parasitic on a sea urchin, *Araesoma owstoni* Mortensen. Venus 50: 233-235.
- ICZN, OPINION 1718. 1993. *Balea* Gray, 1824 (Mollusca: Gastropoda): conserved. Bulletin of Zoological Nomenclature 50:155-156.
- NORRIS, D. R. 1992. The distribution of two irregular echinoids, *Maretia planulata* (Lamarck) and *Metalia dicrana* (Clark) in Apra Harbor, Guam. Galaxea 10:89-95.
- PILSBRY, H. A. 1899. A new Australian *Eulima*. Proceedings of the Academy of Natural Sciences, Philadelphia 1899:258.
- RISSE, A. 1826. Histoire Naturelle de l'Europe Méridionale. 4. Levrault Libraire: Paris. 439 pp.
- WARÉN, A. 1983. An anatomical description of *Eulima bilineata* Alder with remarks on and a revision of *Pyramidelloides* Nevill (Mollusca, Prosobranchia, Eulimidae). Zoologica Scripta 12:273-294.
- WARÉN, A. 1992. *Balea* Gray, 1824 (Mollusca, Gastropoda): proposed conservation. Bulletin of Zoological Nomenclature 49:12-15.
- WARÉN, A. & M. R. CROSSLAND. 1991. Revision of *Hypermastus* Pilsbry, 1899 and *Turveria* Berry, 1956, (Gastropoda: Prosobranchia: Eulimidae), two genera parasitic on sand dollars. Records of the Australian Museum 43:85-112.